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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/641,383	08/17/2000	John Wilkes	10004565	5243

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Hewlett-Packard Company
Intellectual Property Administration
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EXAMINER

INOA, MIDYS

ART UNIT PAPER NUMBER

2188

DATE MAILED: 07/29/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/641,383

Applicant(s)

WILKES ET AL.

Examiner

Midys Inoa

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 20-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 20-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 09 December 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim ³⁶ draws distinction between writing dirty data and demoting clean data however, it is unclear as to the difference between a demote and write operation.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 20-24, 27-31, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi (5,933,853) in view of Yang et al. (6,243,795).

Regarding Claims 20, 22 and 24, Takagi discloses a system including a cache memory 4 ("host cache") and a HDD cache 5 ("storage cache") where data is being transferred between the cache memory and the HDD cache (See Abstract). In Takagi's system data is being staged out or demoted from the cache memory 4 to the HDD cache 5; where in "staging out" involves the moving of data out of the cache memory and into the cache HDD ("evicting a set of information", Column 5, Lines 22-25). Takagi also teaches writing the staged out data in an

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empty area of the disk (“... any free area of the storage system”, Column 5, Lines 30-33).

Takagi does not teach performing a demote operation if the information is clean. Yang et al. teaches the discarding (“demoting”) of a clean block of data to make room for new requests in the primary cache (Column 4, lines 32-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the clean data demote operation of Yang into the system of Takagi because demoting clean data to make room is advantageous since clean data has not yet been modified and no new information would be lost in the discarding of such data.

Regarding Claims 27, 29 and 31, Takagi discloses a computer system with a cache memory 4 (“host cache”) and a HDD cache 5 (“storage system cache”) in which data is being demoted or staged out from cache memory 4 to HDD cache 5 (See Figure 1). In the demotion process, the data is transferred and stored in the HDD cache 5 and therefore, removed from cache memory 4; thus, exclusion is maintained (“means for exclusive caching”, see Column 5, Lines 22-25). It is understood that “staging out” involves the moving of data out of the cache memory and into the cache HDD (“the information is not stored in a storage system cache... and is stored in a host cache”). Takagi also teaches writing the staged out data in an empty area of the disk (“... any free area of the storage system”, Column 5, Lines 30-33). Takagi does not teach performing a demote operation if the information is clean. Yang et al. teaches the discarding (“demoting”) of a clean block of data to make room for new requests in the primary cache (Column 4, lines 32-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the clean data demote operation of Yang into the

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system of Takagi because demoting clean data to make room is advantageous since clean data has not yet been modified and no new information would be lost in the discarding of such data.

Regarding Claims 21 and 28, Takagi teaches the demotion of data from the cache memory 4 to the HDD cache 5 where the process of demoting or staging out includes the operation of transferring data from the cache memory 4 to the HDD cache 5 (Column 5, Line 25). Takagi discloses that the demotion process between the cache memory 4 and the HDD cache 5 is being done through the communication path labeled as a “system bus” in Figure 1.

Regarding Claims 23 and 30, Takagi teaches that in the process of staging out, data is being stored in the free areas of the HDD cache 5, in this case, the empty areas are predetermined sub areas of the HDD cache since they must be identified as “free” prior to the staging out of data (Column 5, Lines 22-35).

Regarding Claim 36, Takagi discloses a system including a cache memory 4 (“host cache”) and a HDD cache 5 (“storage cache”) where data is being transferred between the cache memory and the HDD cache (See Abstract). In Takagi’s system data is being staged out or demoted from the cache memory 4 to the HDD cache 5; where in “staging out” involves the moving of data out of the cache memory and into the cache HDD (“evicting a set of information”, Column 5, Lines 22-25). Takagi does not teach performing a demote operation if the information is clean. Yang et al. teaches the discarding (“demoting”) of a clean block of data to make room for new requests in the primary cache (Column 4, lines 32-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the clean data demote operation of Yang into the system of Takagi because demoting clean data to make room is advantageous since clean data has not yet been modified and no new information

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would be lost in the discarding of such data. It is noted that the demotion operation and the write operation seem to be similar and that no distinction has been made between the two.

Regarding Claim 37, Yang et al. teaches using a NVRAM (battery backed RAM) as a primary cache (host cache, Column 3, lines 34-40).

Regarding Claim 38, the cache memory 4 of Takagi (host cache) is a disk cache (see Figure 2).

5. Claims 25-26 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi (5,933,853) in view of Yang et al. (6,243,795) as applied to independent claims 20 and 27 above, and further in view of Nakamoto (6,253,290). Takagi does not teach the use of a shared status as the basis for eviction. Nakamoto discloses a method that uses the shared status of data to monitor write operations. In this method, unshared data is written back and shared data is written through (Column 2, Lines 48-52). It is understood that in order to for Nakamoto to distinguish between shared and unshared data, his system must keep track of the shared or unshared status of the data. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the shared status taught by Nakamoto as the means for eviction in Takagi in order to ensure that unshared data is properly secured in main memory while making space for shared, more frequently accessed data in the cache.

6. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takagi (5,933,853) in view of Yang et al. (6,243,795) as applied to claims 1-5, 8-13 and 18 above, and further in view of McIntosh-Smith (6,324,632). Takagi does not teach a partition in the storage cache where one partition is for read-ahead data ("other cached information") and the other is for exclusive caching. McIntosh-Smith discloses a partitioned cache where one of the partitions is

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allocated to pre-fetched incoming data stream ("performing a read-ahead operation from the storage media") and the other is being used to store program data (such as that involved in exclusive caching). Please refer to the abstract. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Takagi system to include the partitioned cache in the McIntosh-Smith patent in order to ensure that pre-fetching operations and the exclusive caching system do not interfere.

Response to Arguments

7. Applicant's arguments filed on July 17th, 2003 with respect to the independent claims 20, 27 and 36 have been fully considered but they are not persuasive.

In response to applicant's argument against the combination of Takagi in view of Yang et al., Takagi and Yang disclose exclusive caching in that in the demotion process of Takagi, data is being transferred by removing it from the cache memory 4 (host cache) and storing it in the HDD cache 5 (storage system cache). Therefore, it is understood that exclusion is being maintained in the demotion operation and the system is thus exclusively caching. In addition, although Yang does not specifically teach a host cache, the operation being performed by Yang involves storage entities and can therefore, be adapted and used in another storage system.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Midys Inoa whose telephone number is (703) 305-7850. The examiner can normally be reached on M-F 7:00am - 4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (703) 306-2903. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications and (703) 746-7239 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Midys Inoa

Midys Inoa
Examiner
Art Unit 2188

MI
July 25, 2003

Kevin L. Ellis
Primary Examiner

Kevin L. Ellis